

Amendments to the Specification

On page 8, line 11, paragraph beginning thereat:

a position corresponding to position 4 in the motif sequence 1L: H-A-E-F-T-P-V-F-S (SEQ ID NO 44) or a position corresponding to position 4 in the motif sequence 1H: A-A-Q-Y-S-P-H-F-S (SEQ ID NO: 45);

a position corresponding to position 4 in the motif sequence 2: A-L-G-N-G-G-L-G (SEQ ID NO: 46); and

a position corresponding to position 7 in the motif sequence 3L: R-I-V-K-F-I-T-D-V (SEQ ID NO: 47) or a position corresponding to position 7 in the motif sequence 3H: R-I-V-K-L-V-N-D-V (SEQ ID NO: 48); and wherein

On page 13, line 33, paragraph beginning thereat:

a position corresponding to position 4 in the motif sequence 1L: H-A-E-F-T-P-V-F-S (SEQ ID NO 44) or a position corresponding to position 4 in the motif sequence 1H: H-A-Q-Y-S-P-H-F-S (SEQ ID NO: 45);

a position corresponding to position 4 in the motif sequence 2: A-L-G-N-G-G-L-G (SEQ ID NO: 46); and

a position corresponding to position 7 in the motif sequence 3L: R-I-V-K-F-I-T-D-V (SEQ ID NO: 47) or a position corresponding to position 7 in the motif sequence 3H: R-I-V-K-L-V-N-D-V (SEQ ID NO: 48); and wherein

On page 16, line 24, paragraph beginning thereat:

a position corresponding to position 4 in the motif sequence 1L: H-A-E-F-T-P-V-F-S (SEQ ID NO 44) or a position corresponding to position 4 in the motif sequence 1H: H-A-Q-Y-S-P-H-F-S (SEQ ID NO: 45);

a position corresponding to position 4 in the motif sequence 2: A-L-G-N-G-G-L-G (SEQ ID NO: 46); and

a position corresponding to position 7 in the motif sequence 3L: R-I-V-K-F-I-T-D-V (SEQ ID NO: 47) or a position corresponding to position 7 in the motif sequence 3H: R-I-V-K-L-V-N-D-V (SEQ ID NO: 48);

On page 26, line 2, paragraph beginning thereat:

a position corresponding to position 4 in the motif sequence 1L: H-A-E-F-T-P-V-F-S (SEQ ID NO 44) or a position corresponding to position 4 in the motif sequence 1H: H-A-Q-Y-S-P-H-F-S (SEQ ID NO: 45);

a position corresponding to position 4 in the motif sequence 2: A-L-G-N-G-G-L-G (SEQ ID NO: 46); and

a position corresponding to position 7 in the motif sequence 3L: R-I-V-K-F-I-T-D-V (SEQ ID NO: 47) or a position corresponding to position 7 in the motif sequence 3H: R-I-V-K-L-V-N-D-V (SEQ ID NO: 48) can be obtained.

On page 46, line 12, paragraph beginning thereat:

The present inventors found out that, by substituting an amino acid residue at a particular position in the amino acid sequence of a natural α -glucan phosphorylase derived from a plant, with another amino acid residue, the thermostability of the resulting α -glucan phosphorylase is improved. Such a particular position can be determined by aligning any of the following motif sequences, or the amino acid sequence of SEQ ID NO: 2, and a comparison subject amino acid sequence:

motif sequence 1L: H-A-E-F-T-P-V-F-S (SEQ ID NO: 44) or a motif sequence 1H: H-A-Q-Y-S-P-H-F-S (SEQ ID NO: 45),

motif sequence 2: A-L-G-N-G-G-L-G (SEQ ID NO: 46), and

motif sequence 3L: R-I-V-K-F-I-T-D-V (SEQ ID NO: 47) or motif sequence 3H: R-I-V-K-L-V-N-D-V (SEQ ID NO: 48).

On page 58, line 8, paragraph beginning thereat:

In this manner, the position of an amino acid residue which improves thermostability can be also specified using the motif sequences. A position of an amino acid residue which improves thermostability can be at least one position selected from the group consisting of a position corresponding to position 4 in a motif sequence 1L: H-A-E-F-T-P-V-F-S (SEQ ID NO 44) or a position corresponding to position 4 in a motif sequence 1H: H-A-Q-Y-S-P-H-F-S (SEQ ID NO: 45); a position corresponding to position 4 in a motif sequence 2: A-L-G-N-G-G-L-G (SEQ ID NO: 46); and a position corresponding to position 7 in a motif sequence 3L: R-I-V-K-F-I-T-D-V (SEQ ID NO: 47) or a position corresponding to position 7 in a motif sequence 3H: R-I-V-K-L-V-N-D-V (SEQ ID NO: 48).

On page 58, line 22, paragraph beginning thereat:

Therefore, in the method according to the present invention, it can be said that a nucleic acid molecule comprising a base sequence encoding first α -glucan phosphorylase is modified so that α -glucan phosphorylase having improved thermostability, encoded by a modified nucleic acid has an amino acid residue which is different from an amino acid residue of the natural α -glucan phosphorylase in at least one position selected from the group consisting of a position corresponding to position 4 in a motif sequence 1L: H-A-E-F-T-P-V-F-S (SEQ ID NO 44) or a position corresponding to position 4 in a motif sequence 1H: H-A-Q-Y-S-P-H-F-S (SEQ ID NO: 45); a position corresponding to position 4 in a motif sequence 2: A-L-G-N-G-G-L-G (SEQ ID NO: 46); and a position corresponding to position 7 in a motif sequence 3L: R-I-V-K-F-I-T-D-V (SEQ ID NO: 47) or a position corresponding to position 7 in a motif sequence 3H: R-I-V-K-L-V-N-D-V (SEQ ID NO: 48).

On page 60, line 7, paragraph beginning thereat:

As used herein, "a position corresponding to position 4 in a motif sequence 1L: H-A-E-F-T-P-V-F-S (SEQ ID NO 44) or a position corresponding to position 4 in a motif sequence 1H: H-A-Q-Y-S-P-H-F-S (SEQ ID NO: 45)" refers to position which is aligned with amino acid residue at position 4 in the motif sequence 1L or the motif sequence 1H when a subject amino acid sequence and the motif sequence 1L or the motif sequence 1H are aligned, without inserting a gap, so that homology between sequences is greatest. More preferably, it refers to the position which is aligned with the amino acid residue at position 4 in the motif sequence 1L or the motif sequence 1H when maximum matching of GENETYX-WIN Ver.4.0 (Genetics Co., Ltd.) is performed under no gap condition.

On page 77, line 24, paragraph beginning thereat:

The α -glucan phosphorylase having improved thermostability according to the present invention obtained by the aforementioned method has an amino acid residue which is different from an amino acid residue of the natural α -glucan phosphorylase in at least one position selected from the group consisting of a position corresponding to position 4 in the motif sequence 1L: H-A-E-F-T-P-V-F-S (SEQ ID NO 44) or a position corresponding to position 4 in the motif sequence 1H: H-A-Q-Y-S-P-H-F-S (SEQ ID NO: 45); a position corresponding to position 4 in the motif sequence 2: A-L-G-N-G-G-L-G (SEQ ID NO: 46); and a position corresponding to position 7 in the motif sequence 3L: R-I-V-K-F-I-T-D-V (SEQ ID NO: 47) or a position corresponding to position 7 in the motif sequence 3H: R-I-V-K-L-V-N-D-V (SEQ ID NO: 48).

On page 109, line 1, paragraph beginning thereat:

Then, the reaction solution is heated, if necessary, by the method known in the art, to react it. A reaction temperature can be any temperature as long as the effect of the invention is obtained. A reaction temperature can be representatively about 30°C to about 75 °C. It is preferable that the temperature of a solution in this reaction step is

such a temperature that activity which is about 20% or more, more preferably about 30% or more of activity of α -glucan phosphorylase contained in this solution before a reaction, remains after a predetermined reaction time. This temperature is preferably about 55°C to about 75 °C, more preferably about ~~65°C~~ 60°C to about 75 °C, further preferably about 60°C to about 70 °C, particularly preferably about 60°C to about 65°C.